SEQUENCE LISTING

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<120> Galactanase Variants

<130> 10319.204-US

<160> 9

<170> PatentIn version 3.3

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<212> PRT
<213> Myceliophthora thermophila

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Ala Leu Thr Tyr Arg Gly Val Asp Trp Ser Ser Val Val Val Glu Glu
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Arg Ala Gly Val Ser Tyr Lys Asn Thr Asn Gly Asn Ala Gln Pro Leu
20 25 30

Glu Asn Ile Leu Ala Ala Asn Gly Val Asn Thr Val Arg Gln Arg Val
35 40 45

Trp Val Asn Pro Ala Asp Gly Asn Tyr Asn Leu Asp Tyr Asn Ile Ala
50 55 60

Ile Ala Lys Arg Ala Lys Ala Ala Gly Leu Gly Val Tyr Ile Asp Phe
65 70 75 80

His Tyr Ser Asp Thr Trp Ala Asp Pro Ala His Gln Thr Met Pro Ala
85 90 95

Gly Trp Pro Ser Asp Ile Asp Asn Leu Ser Trp Lys Leu Tyr Asn Tyr
100 105 110

Thr Leu Asp Ala Ala Asn Lys Leu Gln Asn Ala Gly Ile Gln Pro Thr
115 120 125

Ile Val Ser Ile Gly Asn Glu Ile Arg Ala Gly Leu Leu Trp Pro Thr
130 135 140

Gly Arg Thr Glu Asn Trp Ala Asn Ile Ala Arg Leu Leu His Ser Ala
145 150 155 160

Ala Trp Gly Ile Lys Asp Ser Ser Leu Ser Pro Lys Pro Lys Ile Met
165 170 175

Ile His Leu Asp Asn Gly Trp Asp Trp Gly Thr Gln Asn Trp Trp Tyr
180 185 190

Thr Asn Val Leu Lys Gln Gly Thr Leu Glu Leu Ser Asp Phe Asp Met
195 200 205

Met Gly Val Ser Phe Tyr Pro Phe Tyr Ser Ser Ser Ala Thr Leu Ser
210 215 220

Ala Leu Lys Ser Ser Leu Asp Asn Met Ala Lys Thr Trp Asn Lys Glu
225 230 235 240

Ile Ala Val Val Glu Thr Asn Trp Pro Ile Ser Cys Pro Asn Pro Arg
245 250 255

Tyr Ser Phe Pro Ser Asp Val Lys Asn Ile Pro Phe Ser Pro Glu Gly
260 265 270

Gln Thr Thr Phe Ile Thr Asn Val Ala Asn Ile Val Ser Ser Val Ser
275 280 285

Arg Gly Val Gly Leu Phe Tyr Trp Glu Pro Ala Trp Ile His Asn Ala
290 295 300

Asn Leu Gly Ser Ser Cys Ala Asp Asn Thr Met Phe Ser Gln Ser Gly
305 310 315 320

Gln Ala Leu Ser Ser Leu Ser Val Phe Gln Arg Ile
325 330

<210> 2

<211> 332
<212> PRT
<213> Humicola insolens

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Ala Leu Gln Tyr Lys Gly Val Asp Trp Ser Ser Val Met Val Glu Glu
1               5                  10                  15

Arg Ala Gly Val Arg Tyr Lys Asn Val Asn Gly Gln Glu Lys Pro Leu
            20                  25                  30

Glu Tyr Ile Leu Ala Glu Asn Gly Val Asn Met Val Arg Gln Arg Val
        35                  40                  45

Trp Val Asn Pro Trp Asp Gly Asn Tyr Asn Leu Asp Tyr Asn Ile Gln
    50                  55                  60

Leu Ala Arg Arg Ala Lys Ala Ala Gly Leu Gly Leu Tyr Ile Asn Phe
65                  70                  75                  80

His Tyr Ser Asp Thr Trp Ala Asp Pro Ala His Gln Thr Thr Pro Ala
                85                  90                  95

Gly Trp Pro Ser Asp Ile Asn Asn Leu Ala Trp Lys Leu Tyr Asn Tyr
            100                 105                 110

Thr Leu Asp Ser Met Asn Arg Phe Ala Asp Ala Gly Ile Gln Val Asp
        115                 120                 125

Ile Val Ser Ile Gly Asn Glu Ile Thr Gln Gly Leu Leu Trp Pro Leu
    130                 135                 140

Gly Lys Thr Asn Asn Trp Tyr Asn Ile Ala Arg Leu Leu His Ser Ala
145                 150                 155                 160

Ala Trp Gly Val Lys Asp Ser Arg Leu Asn Pro Lys Pro Lys Ile Met
                165                 170                 175

Val His Leu Asp Asn Gly Trp Asn Trp Asp Thr Gln Asn Trp Trp Tyr
            180                 185                 190
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Thr Asn Val Leu Ser Gln Gly Pro Phe Glu Met Ser Asp Phe Asp Met
195 200 205

Met Gly Val Ser Phe Tyr Pro Phe Tyr Ser Ala Ser Ala Thr Leu Asp
210 215 220

Ser Leu Arg Arg Ser Leu Asn Asn Met Val Ser Arg Trp Gly Lys Glu
225 230 235 240

Val Ala Val Val Glu Thr Asn Trp Pro Thr Ser Cys Pro Tyr Pro Arg
245 250 255

Tyr Gln Phe Pro Ala Asp Val Arg Asn Val Pro Phe Ser Ala Ala Gly
260 265 270

Gln Thr Gln Tyr Ile Gln Ser Val Ala Asn Val Val Ser Ser Val Ser
275 280 285

Lys Gly Val Gly Leu Phe Tyr Trp Glu Pro Ala Trp Ile His Asn Ala
290 295 300

Asn Leu Gly Ser Ser Cys Ala Asp Asn Thr Met Phe Thr Pro Ser Gly
305 310 315 320

Gln Ala Leu Ser Ser Leu Ser Val Phe His Arg Ile
325 330

<210> 3
<211> 334
<212> PRT
<213> Aspergillus aculeatus

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Ala Leu Thr Tyr Arg Gly Ala Asp Ile Ser Ser Leu Leu Leu Leu Glu
1 5 10 15

Asp Glu Gly Tyr Ser Tyr Lys Asn Leu Asn Gly Gln Thr Gln Ala Leu
20 25 30

Glu Thr Ile Leu Ala Asp Ala Gly Ile Asn Ser Ile Arg Gln Arg Val
35 40 45

Trp Val Asn Pro Ser Asp Gly Ser Tyr Asp Leu Asp Tyr Asn Leu Glu
50 55 60

Leu Ala Lys Arg Val Lys Ala Ala Gly Met Ser Leu Tyr Leu Asp Leu
65 70 75 80

His Leu Ser Asp Thr Trp Ala Asp Pro Ser Asp Gln Thr Thr Pro Ser
85 90 95

Gly Trp Ser Thr Thr Asp Leu Gly Thr Leu Lys Trp Gln Leu Tyr Asn
100 105 110

Tyr Thr Leu Glu Val Cys Asn Thr Phe Ala Glu Asn Asp Ile Asp Ile
115 120 125

Glu Ile Ile Ser Ile Gly Asn Glu Ile Arg Ala Gly Leu Leu Trp Pro
130 135 140

Leu Gly Glu Thr Ser Ser Tyr Ser Asn Ile Gly Ala Leu Leu His Ser
145 150 155 160

Gly Ala Trp Gly Val Lys Asp Ser Asn Leu Ala Thr Thr Pro Lys Ile
165 170 175

Met Ile His Leu Asp Asp Gly Trp Ser Trp Asp Gln Gln Asn Tyr Phe
180 185 190

Tyr Glu Thr Val Leu Ala Thr Gly Glu Leu Leu Ser Thr Asp Phe Asp
195 200 205

Tyr Phe Gly Val Ser Tyr Tyr Pro Phe Tyr Ser Ala Ser Ala Thr Leu
210 215 220

Ala Ser Leu Lys Thr Ser Leu Ala Asn Leu Gln Ser Thr Tyr Asp Lys
225 230 235 240

Pro Val Val Val Val Glu Thr Asn Trp Pro Val Ser Cys Pro Asn Pro
245 250 255

Ala Tyr Ala Phe Pro Ser Asp Leu Ser Ser Ile Pro Phe Ser Val Ala
260 265 270

Gly Gln Gln Glu Phe Leu Glu Lys Leu Ala Ala Val Val Glu Ala Thr
275 280 285

Thr Asp Gly Leu Gly Val Tyr Tyr Trp Glu Pro Ala Trp Ile Gly Asn
290 295 300

Ala Gly Leu Gly Ser Ser Cys Ala Asp Asn Leu Met Val Asp Tyr Thr
305 310 315 320

Thr Asp Glu Val Tyr Glu Ser Ile Glu Thr Leu Gly Glu Leu
325 330

<210> 4
<211> 399
<212> PRT
<213> Bacillus licheniformis

<400> 4

Ala His Arg Asp Ser Gly Thr Ala Lys Ser Gly Leu Tyr Val Glu Lys
1 5 10 15

Val Ser Gly Leu Arg Lys Asp Phe Ile Lys Gly Val Asp Val Ser Ser
20 25 30

Ile Ile Ala Leu Glu Glu Ser Gly Val Ala Phe Tyr Asn Glu Ser Gly
35 40 45

Lys Lys Gln Asp Ile Phe Asn Thr Leu Lys Glu Ala Gly Val Asn Tyr
50 55 60

Val Arg Val Arg Ile Trp Asn Asp Pro Tyr Asp Ala Asn Gly Asn Gly
65 70 75 80

Tyr Gly Gly Gly Asn Asn Asp Leu Glu Lys Ala Ile Gln Ile Gly Lys
85 90 95

Arg Ala Asn Ala Asn Gly Met Lys Leu Leu Ala Asp Phe His Tyr Ser
100 105 110

Asp Phe Trp Ala Asp Pro Ala Lys Gln Lys Ala Pro Lys Ala Trp Ala
115 120 125

Asn Leu Asn Phe Glu Asp Lys Lys Thr Ala Leu Tyr Gln Tyr Thr Lys
130 135 140

Gln Ser Leu Lys Ala Met Lys Ala Ala Gly Ile Asp Ile Gly Met Val
145 150 155 160

Gln Val Gly Asn Glu Thr Asn Gly Gly Leu Ala Gly Glu Thr Asp Trp
165 170 175

Ala Lys Met Ser Gln Leu Phe Asn Ala Gly Ser Gln Ala Val Arg Glu
180 185 190

Thr Asp Ser Asn Ile Leu Val Ala Leu His Phe Thr Asn Pro Glu Thr
195 200 205

Ser Gly Arg Tyr Ala Trp Ile Ala Glu Thr Leu His Arg His His Val
210 215 220

Asp Tyr Asp Val Phe Ala Ser Ser Tyr Tyr Pro Phe Trp His Gly Thr
225 230 235 240

Leu Lys Asn Leu Thr Ser Val Leu Thr Ser Val Ala Asp Thr Tyr Gly
245 250 255

Lys Lys Val Met Val Ala Glu Thr Ser Tyr Thr Tyr Thr Ala Glu Asp
260 265 270

Gly Asp Gly His Gly Asn Thr Ala Pro Lys Asn Gly Gln Thr Leu Asn
275 280 285

Asn Pro Val Thr Val Gln Gly Gln Ala Asn Ala Val Arg Asp Val Ile
290 295 300

Gln Ala Val Ser Asp Val Gly Glu Ala Gly Ile Gly Val Phe Tyr Trp
305 310 315 320

Glu Pro Ala Trp Ile Pro Val Gly Pro Ala His Arg Leu Glu Lys Asn
325 330 335

Lys Ala Leu Trp Glu Thr Tyr Gly Ser Gly Trp Ala Thr Ser Tyr Ala
340 345 350

Ala Glu Tyr Asp Pro Glu Asp Ala Gly Lys Trp Phe Gly Gly Ser Ala
355 360 365

Val Asp Asn Gln Ala Leu Phe Asp Phe Lys Gly Arg Pro Leu Pro Ser
370 375 380

Leu His Val Phe Gln Tyr Val Asp Thr Gly Thr Pro Phe Lys Asn
385 390 395

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<212> DNA
<213> Artificial Sequence

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<223> Synthetic

<220>
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<223> Primer

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<400> 6
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Ala Leu Thr Tyr Arg Gly Ala Asp Ile Ser Ser Leu Leu Ile Glu Glu
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Asp Ala Gly Ile Ser Tyr Lys Asn Leu Asn Gly Glu Thr Gln Ala Leu
            20                  25                  30

Glu Asp Ile Leu Val Asn Asn Gly Val Asn Ser Ile Arg Gln Arg Val
        35                  40                  45

Trp Val Asp Pro Ser Asp Gly Ser Tyr Asp Leu Asp Tyr Asn Leu Lys
    50                  55                  60

Leu Ala Lys Arg Val Gln Ala Ala Gly Met Ser Ile Tyr Leu Asp Leu
65                  70                  75                  80

His Leu Ser Asp Thr Trp Ala Asp Pro Ser Asp Gln Thr Thr Pro Thr
                85                  90                  95

Gly Trp Ser Thr Thr Asp Ile Asp Thr Leu Thr Trp Gln Leu Tyr Asn
            100                 105                 110

Tyr Thr Leu Glu Val Cys Asn Thr Phe Ala Glu Asn Asp Ile Asp Val
        115                 120                 125

Glu Ile Val Ser Ile Gly Asn Glu Ile Ser Ser Gly Leu Leu Trp Pro
    130                 135                 140

Leu Gly Lys Thr Ser Asn Tyr Asp Asn Ile Ala Lys Leu Leu His Ser
145                 150                 155                 160

Gly Ala Trp Gly Val Lys Asp Ser Asp Leu Thr Thr Thr Pro Lys Ile
                165                 170                 175

Met Ile His Leu Asp Asn Gly Trp Asp Trp Asp Glu Gln Glu Tyr Phe
            180                 185                 190

Tyr Lys Thr Val Leu Ala Thr Gly Ser Leu Leu Ser Thr Asp Phe Asp
        195                 200                 205

Leu Met Gly Val Ser Tyr Tyr Pro Phe Tyr Ser Ser Glu Ala Thr Leu
    210                 215                 220
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Ser Ser Leu Lys Thr Ser Leu Thr Asn Met Gln Ser Asn Tyr Asp Lys
225 230 235 240

Pro Val Val Val Val Glu Thr Asn Trp Pro Val Ser Cys Pro Asp Pro
245 250 255

Glu Tyr Ser Phe Pro Ser Asp Leu Thr Ser Ile Pro Phe Ser Ala Ala
260 265 270

Gly Gln Glu Glu Phe Leu Glu Lys Leu Ala Glu Val Val Glu Gly Val
275 280 285

Thr Asp Gly Leu Gly Ile Tyr Tyr Trp Glu Pro Ala Trp Ile Asp Asn
290 295 300

Ala Gly Leu Gly Ser Ser Cys Ala Asp Asn Leu Met Val Asp Val Asn
305 310 315 320

Thr Asp Glu Val Leu Glu Ser Val Thr Val Phe Glu Asp Leu
325 330

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<211> 372
<212> PRT
<213> Bacillus subtilis

<220>
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Met Asn Lys Asp Phe Ile Lys Gly Ala Asp Val Ser Ser Val Ile Ala
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Leu Glu Asn Ser Gly Val Thr Phe Tyr Asn Thr Asn Gly Lys Arg Gln
20 25 30

Asp Ile Phe Thr Thr Leu Lys Gln Ala Gly Val Asn Tyr Val Arg Val
35 40 45

Arg Ile Trp Asn His Pro Tyr Asp Ser Asn Gly Asn Gly Tyr Gly Gly
50 55 60

Gly Asn Asn Asp Val Gln Lys Ala Ile Glu Ile Gly Lys Arg Ala Thr
65 70 75 80

Ala Asn Gly Met Lys Val Leu Ala Asp Phe His Tyr Ser Asp Phe Trp
85 90 95

Ala Asp Pro Ala Lys Gln Lys Val Pro Lys Ala Trp Ala Asn Leu Ser
100 105 110

Phe Glu Ala Lys Lys Ala Lys Leu Tyr Glu Tyr Thr Lys Gln Ser Leu
115 120 125

Gln Lys Met Ile Lys Glu Gly Val Asp Ile Gly Met Val Gln Val Gly
130 135 140

Asn Glu Thr Thr Gly Gly Phe Ala Gly Glu Thr Asp Trp Thr Lys Met
145 150 155 160

Cys Gln Leu Phe Asn Glu Gly Ser Arg Ala Val Arg Glu Thr Asn Ser
165 170 175

Asn Ile Leu Val Ala Leu His Phe Thr Asn Pro Glu Thr Ala Gly Arg
180 185 190

Tyr Ser Phe Ile Ala Glu Thr Leu Ser Lys Asn Lys Val Asp Tyr Asp
195 200 205

Val Phe Ala Ser Ser Tyr Tyr Pro Phe Trp His Gly Thr Leu Gln Asn
210 215 220

Leu Thr Ser Val Leu Lys Ala Val Ala Asn Thr Tyr Gly Lys Lys Val
225 230 235 240

Met Val Ala Glu Thr Ser Tyr Thr Tyr Thr Ala Glu Asp Gly Asp Gly
245 250 255

His Gly Asn Thr Ala Pro Lys Ser Gly Gln Thr Leu Pro Tyr Pro Ile
260 265 270

Ser Val Gln Gly Gln Ala Thr Ala Val Arg Asp Val Met Glu Ala Val
275 280 285

Ala Asn Thr Gly Lys Ala Gly Leu Gly Val Phe Tyr Trp Glu Pro Ala

290 295 300

Trp Ile Pro Val Gly Pro Lys Thr Gln Ile Glu Lys Asn Lys Val Leu
305 310 315 320

Trp Glu Thr Tyr Gly Ser Gly Trp Ala Ser Ser Tyr Ala Ala Glu Tyr
325 330 335

Asp Pro Glu Asp Ala Gly Lys Trp Tyr Gly Gly Ser Ala Val Asp Asn
340 345 350

Gln Ala Leu Phe Asp Phe Asn Gly His Pro Leu Pro Ser Leu Gln Val
355 360 365

Phe Gln Tyr Ala
370

<210> 9
<211> 359
<212> PRT
<213> Pseudomonas fluorscens

<220>
<221> mat_peptide
<222> (1)..()

<400> 9

Asn Thr Gly Val Ala Asp Asn Thr Pro Phe Tyr Val Gly Ala Asp Leu
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Ser Tyr Val Asn Glu Met Glu Ser Cys Gly Ala Thr Tyr Arg Asp Gln
20 25 30

Gly Lys Lys Val Asp Pro Phe Gln Leu Phe Ala Asp Lys Gly Ala Asp
35 40 45

Leu Val Arg Val Arg Leu Trp His Asn Ala Thr Trp Thr Lys Tyr Ser
50 55 60

Asp Leu Lys Asp Val Ser Lys Thr Leu Lys Arg Ala Lys Asn Ala Gly
65 70 75 80

Met Lys Thr Leu Leu Asp Phe His Tyr Ser Asp Thr Trp Thr Asp Pro
85 90 95

Glu Lys Gln Phe Ile Pro Lys Ala Trp Ala His Ile Thr Asp Thr Lys
100 105 110

Glu Leu Ala Lys Ala Leu Tyr Asp Tyr Thr Thr Asp Thr Leu Ala Ser
115 120 125

Leu Asp Gln Gln Gln Leu Leu Pro Asn Leu Val Gln Val Gly Asn Glu
130 135 140

Thr Asn Ile Glu Ile Leu Gln Ala Glu Asp Thr Leu Val His Gly Ile
145 150 155 160

Pro Asn Trp Gln Arg Asn Ala Thr Leu Leu Asn Ser Gly Val Asn Ala
165 170 175

Val Arg Asp Tyr Ser Lys Lys Thr Gly Lys Pro Ile Gln Val Val Leu
180 185 190

His Ile Ala Gln Pro Glu Asn Ala Leu Trp Trp Phe Lys Gln Ala Lys
195 200 205

Glu Asn Gly Val Ile Asp Tyr Asp Val Ile Gly Leu Ser Tyr Tyr Pro
210 215 220

Gln Trp Ser Glu Tyr Ser Leu Pro Gln Leu Pro Asp Ala Ile Ala Glu
225 230 235 240

Leu Gln Asn Thr Tyr His Lys Pro Val Met Ile Val Glu Thr Ala Tyr
245 250 255

Pro Trp Thr Leu His Asn Phe Asp Gln Ala Gly Asn Val Leu Gly Glu
260 265 270

Lys Ala Val Gln Pro Glu Phe Pro Ala Ser Pro Arg Gly Gln Leu Thr
275 280 285

Tyr Leu Leu Thr Leu Thr Gln Leu Val Lys Ser Ala Gly Gly Met Gly
290 295 300

Val Ile Tyr Trp Glu Pro Ala Trp Val Ser Thr Arg Cys Arg Thr Leu
305 310 315 320

Trp Gly Lys Gly Ser His Trp Glu Asn Ala Ser Phe Phe Asp Ala Thr
325 330 335

Arg Lys Asn Asn Ala Leu Pro Ala Phe Leu Phe Phe Lys Ala Asp Tyr
340 345 350

Gln Ala Ser Ala Gln Ala Glu
355